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ABSTRACT

The purpose of this paper was to relate Jean Piaget's stages of the learning process to the developmental aspects involved in reading comprehension. The need to correlate the developmental stage of the child's mind with the right types of activities was stressed. When a child has succeeded in the task of relating knowledge and affect to language learning, the two processes have become intercoordinated and functional for the child. As he perceives the arbitrary symbol, the symbol is able to elicit the meaning and affect which the child has developed actively for himself. He is ready to move to the next stage of the language continuum, that of expressing his personal knowledge, feelings, and thoughts in terms of symbols or written words. Four points were made which should provide insight into the advanced stages of reading comprehension: to be functional, learning must be based upon understanding of knowledge; neither learning nor knowledge alone can facilitate reading comprehension; learning and knowledge complement one another within the language domain; the development of meaning and the learning of language are both complex and sequential. [Marginal reproducibility of Appendix A and B.] (RW)

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THE DEVELOPMENTAL ASPECTS OF READING COMPREHENSION

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Before I start, I would like to apologize to you for the misleading title of this paper. The title implies both that the developmental aspects of reading comprehension are well known and that they can be communicated readily in a brief space. Neither is the case! The space allotted here is not sufficient for us to explore all that is known at present about the development of reading comprehension. More important, large gaps remain in our knowledge of the development of the complex of skills which are united under the deceptively simple term 'reading comprehension.' In looking at only one facet of the comprehension process, McNeill (1970, vii) so aptly stated that the difficulty of developmental analysis is not unlike the "problem of reconstructing a dinosaur while the bones are still being excavated." Drawing upon his analogy in looking at the total process of reading comprehension, we must reconstruct not one but rather a whole family of dinosaurs. With these factors in mind I would be more comfortable if you would consider this paper to be a discussion of some of the important developmental aspects of reading comprehension rather than either a study of completed reconstructions or an excavation into the unknown.

Upon finding a fossil, a scientist attempting to reconstruct a dinosaur must first determine whether or not the fossil belonged to a dinosaur in the first place. In the process, misconceptions often lead to mistakes and deterred progress. Similarly, educators have encountered difficulty due to misconceptions about the nature of reading comprehension. One of the major causes is the prevalent concept of the term reading

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comprehension, unfortunate in that it tends to imply that the process of deriving meaning from the written word is an entity unto itself, independent of other processes. Our subsequent analysis will reveal this to be wrong on two counts. First, reading comprehension is the culmination of the development of several earlier processes, distinct but parallel in nature. Second, reading comprehension is not an 'all or none' phenomenon but follows a continuum from the time of appearance through to the degree of skill ultimately attained by a given individual.

Closely related, if not another way of expressing the above, is the process-product confusion about reading comprehension. The probable cause of this confusion among educators appears to be the practice of standardized testing. Since reading comprehension typically is reported in psychometric terms, it is more apt to be perceived as a static product rather than as a dynamic process.

It is these misconceptions, among others, which are reflected in contemporary educational practice. They are visible in the common attempts to measure reading comprehension in non-readers, an obvious disregard for the developmental processes which result in reading comprehension. They are implicit in the many attempts to introduce formal reading instruction earlier than in the past. Most important, ignoring the process has caused us to err in thinking that we can teach the product. Thus, much emphasis has been placed upon 'teaching' reading comprehension as a product without regard for the futility of the endeavor.

When reading comprehension appears in a child simultaneously with formal instruction, we have tended to attribute its appearance to the instruction rendered. What we have failed to recognize is that the child who develops reading comprehension at the time he is instructed already

has acquired the developmental and learning competencies essential to success. Reading comprehension would have followed naturally in that child without regard to instruction per se. By the same token, if a child has not acquired the competencies essential to success at the time of instruction, he will not develop reading comprehension at that time no matter what instructional strategies are employed. In such a situation, we tend not to assume the responsibility but rather to make the child the scapegoat, often citing limited intelligence as the cause of failure. Thus, our failure to recognize the process or developmental aspects involved in reading comprehension places a double burden on the latter child.

What are the known process variables which interact to comprise reading comprehension? To answer that question, I shall define reading comprehension as 'the ability to decipher another's message from written language.' While the definition is an obvious oversimplification, if we subject it to analysis, it will aid us in our quest for key variables involved in the process of reading with meaning.

The first key word in the definition is 'ability' which implies intelligence, the most common variable associated with reading. However, its significance has been overestimated. The multitude of studies which have been carried out on the relationship between reading ability and intelligence have yielded correlations of the magnitude of .50 leaving 75% of the variance to be accounted for by other factors. Yet, we would be remiss if we failed to look at the developmental aspects of intelligence as they contribute to reading comprehension.

The second key word in the definition is 'decipher' which implies the skill of decoding or extracting meaning. The analysis involved

requires thought while meaning implies understanding and knowledge. Thus, both thought and knowledge become variables which must be explored developmentally if we are to understand reading comprehension.

'Message' is the third key word in our definition. While it sounds simple, a message may be very complex. It may be cognitive, affective, or both. The very same message also may be concrete, symbolic, abstract, or all three simultaneously. This multi-dimensional word implies that reading comprehension involves knowledge, affect, and thought, the last derived from the dimensions of symbolism and abstraction. Thus, the word 'message' confirms the fact that we must look at the development of knowledge and thought. In addition, it provides us with a new variable to be considered, that of affect.

'Written' may not be considered by some to be a key word since it involves a facet of the language domain. However, I have chosen to single it out in the present context since it implies the use of perception, an obvious process in reading comprehension. As a result, the process of perception must be added to our list of variables to be explored.

'Language' is the final key word in our definition. By definition, language is an arbitrary means of social communication. There is no inherent meaning in a word itself nor is the infant born with an innate understanding of the word. While meaning must be developed actively by the child, language must be learned. Thus, language and learning become additional developmental variables which contribute to the process of deriving meaning from the written word.

The analysis of our definition indicates that in order to understand the process of reading comprehension, we must study the develop-

mental aspects of intelligence, knowledge, thought, affect, perception, language, and learning, no mean task. Each of these variables has come under the scrutiny of many theorists and researchers, both without and within the framework of reading comprehension. However, only one theorist and researcher has explored all of the variables which we have succeeded in identifying, albeit outside of the framework of reading comprehension. The one scholar who has unified all of the strands is Jean Piaget. It is to him and his endeavors of more than 50 years that we owe many of the insights which follow.

There are two other important reasons why I have opted to use Piaget's model as the major framework for our discussion. First, he not only deals developmentally with the variables under consideration but he also speaks to the interrelationships of variables. In my estimation, this is an important contribution since it is the interaction of the variables which results in reading comprehension and that interaction cannot occur independently of development. Second, the variables which we have identified involve both innate and environmental factors. Piaget's model takes into consideration both of these factors. However, the second reason involves more than goodness of fit. It is Piaget's position on the innate factors which holds out hope to educators. His position is in opposition to the concept of specific genetic programming which is currently in vogue. That concept, advanced by Lorenz (1969) and Jensen (1969) among others, leads to the ultimate conclusion that we as educators cannot succeed in helping many children due to their inherent limitations. Piaget (1970) states that the innate factors involved in the processes under consideration are not specific but rather general, including the inheritance of a healthy nervous system and body.

For educators, that position is more optimistic than the specific genetic programming view for, given such genetic endowment, the child is equipped to develop all of the processes which we have identified as contributing to reading comprehension. And therein lies the very essence of Piaget's model, i.e., the child actively develops his own cognitive processes through interactions with his environment.

In embracing Piaget's position, we must dispense with the analogy used earlier for it is not we who reconstruct the 'family of dinosaurs' involved in reading comprehension. It is the child himself who actively does so, reinventing knowledge as he develops and experiences his environment. The loss of our analogy is minor but the implications for educators are major. Implicitly, Piaget's position redefines our role as educators, limiting it to the facilitation of developmental and learning processes. If we are to fill the role adequately, the onus is on us to recognize the origins and sequential nature of each of the variables involved in reading comprehension. Further, it becomes essential that we develop the ability to recognize the stages of growth which precede the emergence of reading comprehension as well as the stages of reading comprehension itself. Without such abilities, we could neither diagnose where a child is functioning in a given sequence nor could we determine what he needs to facilitate his development.

Where do we look for the origins and sequences of growth which lead to reading comprehension? At the risk of sounding facetious, I would like to propose that we look in the crib. (That is not to imply that you should rush out and attempt to teach infants to read however.) Startling as the statement may seem, it becomes far less so when one considers that the phenomenon which we call reading comprehension has

had a long and arduous history before it emerges as a recognizable, measurable skill. An important part of that history takes place in infancy. Of course we will not find reading comprehension per se in the infant but we will find the origins and early sequences of intelligence, knowledge, thought, affect, perception, language, and learning. However, it takes an astute observer to recognize each of the processes as they develop. A casual observer may well dismiss them as random behaviors on the part of the infant.

Piaget has been just such an astute observer. As a result, he provides us with many answers as to how the processes manifest themselves in infant behavior. Careful study of his substantial works on the sensori-motor period, that period from birth to approximately age two, provides us both with an understanding of infancy and with a framework for observing and interpreting infant behavior. Further, Piaget's works sensitize us to the import of infant development to all later cognitive development.

Sensori-Motor Development

Unfortunately, space does not permit us to do justice to the wealth of information which Piaget provides. The best that we can do is to summarize the general characteristics of the sensori-motor stage preliminary to our discussion of the development of the variables under consideration. Among the general characteristics the following are most relevant to our discussion:

1. The active development within this stage as within all others is hierarchical, moving from the simple to the complex in a fixed sequence.

2. The child is born with a number of reflexes which are uncoordinated initially. These are the innate factors

referred to earlier.

3. In exercising his reflexes, the child slowly starts to assimilate his environment. The assimilation and the resultant accommodation lead to affect and cognition, in that order.

4. The rate of development is a function of the quality of both the innate factors and the environment.

5. Objects, including people, contribute to the quality of the environment. It is they which enable the child, through his own activity, to coordinate his first reflexes.

6. The quality of the first two years of life contributes to later cognitive development, although Piaget does not specify the quality of the environment as a necessary condition to knowing.

From this brief review of some general characteristics of the sensori-motor period, we can conclude that all affective and cognitive processes originate with reflexes. Perception also originates in reflexive behavior. From the reflexive stage, each process develops sequentially throughout the sensori-motor period. The sequences of cognitive development during the stage under consideration have been delineated best by Piaget. However, affect and perception have been and remain under extensive investigation by others both as independent variables (Spitz, 1965 and Gibson, 1969) and in combination with other variables (DeCárie, 1965 and Bruner, 1969).

Perception becomes coordinated with the other innate reflexes and then with other cognitive processes throughout the sensori-motor period. In spite of this, Piaget maintains that perception and cognition must be considered as discrete processes. Affect during the sensori-motor period is considered to be largely the result of non-verbal communication and is manifested primarily in self-esteem. While affect appears earlier in life than cognition does, Piaget is of the opinion that the two are inseparable phenomena, a position which should become clearer as we look

at the next stage of his theory.

The most obvious sequential events during the sensori-motor period take place in the development of intelligence, thought, and knowledge. Since all are variables which we have identified as contributing to reading comprehension, their development is of substantial interest to us. However, in the process of summarizing their development we do a great injustice to Piaget since we are forced to omit his beautiful examples and careful logic. Thus, neither this text nor the charts appended capture the richness of his observations.

Perusal of the development of intelligence indicates that it passes through six substages during the sensori-motor period. Throughout, the reflexes are used to assimilate and accommodate knowledge. Thus, the first substage in the development on intelligence is that of reflexive behavior while each of the next four contains both adaptive behaviors and circular reactions which permit the child to develop and consolidate new behaviors. The sixth substage is the most cogent to our discussion for it is here that the child interiorizes actions, distinguishes means from ends, and invents new means to accomplish a task through mental recombinations. According to Piaget (1952), the interiorization of action results in schemas or the rudimentary concepts of general intelligence. Implicitly, schemas include the knowledge acquired by the infant through actions upon objects and through interactions with others. They constitute the practical intelligence of childhood which remains with the child, gets reconstructed as new knowledge is assimilated, and eventually is expressed in language as well as in action.

Simultaneously with the development of intelligence, thought is developed actively by the infant. The two processes share much more than

the timing of their origins however. First, action on and perception of objects, including people, are essential to the development of thought just as they are to the development of intelligence. Second, the development of thought goes through six substages during the sensori-motor period as does the development of intelligence. Further, both processes share a common first stage, that of reflexive behavior. Despite the commonalities, one major difference marks the development of thought from the development of intelligence. That is, the infant not only acts upon objects in his environment but he also imitates them in developing symbolic processes. Thus, substages two through five are expressed in a hierarchical continuum characterized by increasingly accurate imitation. In these substages, imitation is sporadic initially and becomes systematic, ultimately involving imitation of new models whether or not the child is able to perceive those parts of his body used in imitation (Piaget, 1962). However, just as in the development of intelligence, it is the sixth substage which is of the most interest to us since it is marked by deferred imitation. Simply stated, there is a time lag between the perception of the model and the actual imitation of the model. Piaget (1962) interprets deferred imitation as evidence of the internalization of imitation as images which become the vehicles for thought.

As indicated above, the development of intelligence and symbolic thought both include the development of knowledge. However, Piaget (1954) analyzes the development of knowledge within still another framework, that of the development of the object concept. The object concept is developed throughout the sensori-motor period and as with the preceding processes, goes through six substages ranging from nonspecific behaviors toward vanished objects through mental representations of absent objects.

It is the latter which is most important to us although we know that mental representation cannot take place until the child has acquired all of the earlier behaviors in the sequence. The import of the sixth substage to us is that it marks the origins of cognitive structures in the child, an event essential to future cognitive development.

Noteworthy is the omission of learning and language from our discussion of the sensori-motor stage. That does not mean that they are absent. On the contrary, learning as the term traditionally is used is present in all of the processes summarized above. However, it was omitted intentionally since Piaget restricts his definition of learning to those arbitrary behaviors which are superimposed upon the child by his environment in marked contrast to the active development of knowledge by the child himself.

Language is a good illustration of learning for Piaget since it is arbitrary and determined by the culture into which the child is born. Piaget refers to oral language as 'signs' which are learned by the child through his interaction with others. However, signs are not learned until after the child has developed knowledge of his environment through action upon the objects within it. When he knows an object through his own activity, the child becomes ready to attach the arbitrary label which his culture uses to designate that object. Thus, spoken language of necessity lags behind the development of knowledge and thought.

However, language learning was not omitted here by design. The omission is simply a reflection of the fact that the first stage in the language continuum does not manifest itself overtly. The sensori-motor period is utilized primarily for the aural or hearing stage in language development. While this may appear to be a limitation for the child, it

is not. The child is not spending his first 18 months or so of life passively. Rather, he is absorbing the patterning of the language which his culture will expect him to learn.

Near the end of the sensori-motor period, the first oral language appears. Piaget attributes this to imitation rather than to the communication of meaning. McNeill (1970) appears to be in accord although he utilizes the framework of developmental psycholinguistics in his study of oral language. Aside from direct observations of children's vocalizations, there is good reason for assuming the stated position. That is, until the end of the sensori-motor stage, the child has no internal representations and consequently no need to express himself in any way but through action. Nonverbal communication meets the needs of the sensori-motor child very well.

Preoperational Development

With the internalization of action and the resultant representation, the child moves into the second stage of Piaget's model, the preoperational stage. As in the previous stage, each process continues to develop throughout this period in a hierarchical, sequential pattern. In looking at this stage, we shall see that the preoperational child demonstrates some unusual behaviors, behaviors unique to that stage. It is these same behaviors which are often misconstrued by adults who have labored under the mistaken impression that children from two to seven or eight learn in the same way that they do, albeit more simplistically. However, closer inspection indicates that children in the preoperational stage not only learn differently than those in other stages but that they also think differently.

There are sound developmental reasons for the observed differences between the preoperational child and the older child which educators must come to recognize as universal characteristics of children in the stage under consideration. One of the major causes lies in the fact that both the images which represent objects in figural knowledge and the signs which represent rudimentary concepts in general knowledge remain preoperational or static during the period under consideration. This is a complex point which should become clearer as we look at the continuing development of each of the processes which we have succeeded in identifying as contributing to reading comprehension.

In summarizing preoperational development, let us turn first to the sign, the arbitrary designation for the spoken word. I suggest that we start here since the second stage of the language sequence, the stage of oral language, is readily visible, that is, audible, in the preoperational period. As was suggested earlier, all of the meaning which the child has associated with an object through his actions upon it must be transferred to the arbitrary designations or labels by which the object is identified in his culture. Of necessity, this is a long, slow process since the child first must learn the arbitrary designations of his culture and then must make the functional transfer of meaning from the object to the sign or word. It is this process in particular which reflects the richness of a child's experience during the sensori-motor period as well as during the present period. The richer the sensori-motor environment, the more objects the child has had available to act upon and to imitate, the greater is his comprehension of the world, within the developmental limits imposed upon him by his own state of

maturation. Bernstein (1967) also points out that the richer the language stimulation throughout the child's early life, the richer the vocabulary which the child will have at his disposal to express his newly gained knowledge and thought.

Unfortunately, this latter development has been misconstrued by adults due to the fact that the child's language is more overt than either his knowledge or thought processes. As a result, in educational practice, we have attempted to teach language, assuming that knowledge and thought will follow. However, we have been in serious error. The sole purpose of language is to communicate one's knowledge, thoughts, and feelings. Sinclair (1967) and Furth (1966) both have made this point well although their approaches have been quite different. Sinclair attempted the very difficult task of teaching higher order language such as comparatives to children in the preoperational stage. However, she found that once the comparative forms were learned, there was no comparable change in the nature of the children's thought. Moreover, the children in Piaget's third stage, the concrete operational period, gained such understandings themselves and used comparatives without benefit of formal training. Furth, by contrast, worked with older deaf children who had acquired no oral language due to their deficits. Yet, these same children demonstrated their ability to think logically, indicating that thought precedes language. Both studies support Piaget's position that language is a necessary but not a sufficient condition to knowing and thinking.

Piaget (1955) deals with the sequences of oral language development during the preoperational stage. As indicated earlier, McNeill (1970), utilizing cross-cultural samples, does the same. The latter's work

demonstrates universals in the language of young children without regard to the culture into which they were born. One of the many interesting facets of McNeill's work demonstrates that as oral language becomes more functional, it departs further from the adult models utilized in the beginnings of oral language when speech was merely a function of imitation. Piaget would say that when the child reaches this stage of language development, he is using speech functionally to express his personal knowledge, thought and feelings.

The above studies indicate that in order to gain an understanding of knowledge and thought in the child, language is one of the behaviors which can be analyzed. Piaget does this in looking at the development of thought in the preoperational child. However, he does not stop with that technique. He studies the child's other behaviors as well since all of the child's behaviors reflect both his knowledge and his thought.

Utilizing the above techniques, Piaget demonstrates that knowledge and intelligence expand as the child continues to interact with his environment. The rudimentary cognitive concepts or preconcepts move in the direction of functional hierarchical concepts. During the preoperational stage, the child advances his knowledge from simple object concepts in the direction of understanding such universals as time, space, and causality. As a result, object concepts are expanded gradually into simple classifications, sometimes accurate and sometimes inaccurate but always reflecting the intercoordinations of cognitive structures. Of late, Piaget utilizes the term 'decaulage' to represent preconcepts and other unfinished cognitive structures. Thus, in the realm of knowledge, the child is working to eliminate both vertical and horizontal decaulages as he passes through the preoperational stage. When the child succeeds

in developing partial structures into complete structures and incomplete coordinations into complete coordinations, the child is well on his way to operational knowledge and intelligence.

Why cannot the preoperational child learn such concepts through formal instruction rather than engaging in the long process of coming to know them? The answer is related to the degree of understanding required in knowing. Traditional teaching results in verbalizations and perhaps memorization but not understanding. At best, learning in the preoperational child as a result of instruction takes the form of conditioning which does little or nothing to enhance understanding. Thus, Piaget takes the position that we must be patient with the length of time that coming to know takes. Without such patience on our part, we err in introducing formal instruction too early at the expense of permitting the child active exploration of his environment. Instead of facilitating knowledge, we actually interfere with the child's attempts to derive meaning and order from his universe. The resultant implications for educational practice are overwhelming. Although we cannot develop them here, some have been developed by the author in an earlier paper.

Perception develops systematically throughout the preoperational stage, accounting for many of the unique characteristics of the child while in that stage. The preoperational child is limited by his perception in at least two ways. First, perception for the preoperational child is inconstant. Second, the preoperational child is dominated by his perceptions, totally unaware of the inconstancy. Piaget's now classic experiments on conservation indicate the difficulty which the child from two to seven or eight experiences with perception. The child

knows only that which he perceives, whether it is perceived accurately or not. Thus, the child attributes all causality to something visible or tangible. As an illustration of this point, Piaget cites the child who gave the answer "Because the trees move" when asked why the wind blows.

Throughout the preoperational period, perception moves from a state of inconstancy to constancy, culuminating in the ability to conserve. Yet, conservation appears in a definite sequence from number conservation through volume conservation, typically in the period from seven to eleven years of age. Thus, the preoperational child is doomed to deception as reflected in his behaviors and thought. Again, the implications for educating the preoperational child are overwhelming as is the frequency of inadvertent educational mismanagement.

The inconstant perception of the preoperational child influences thought through influencing knowledge. The end result is that the thought of the preoperational child is unique although it is not unusual to see remnants of preoperational thought at later stages of development. As was indicated earlier, the thought of the preoperational child is static. Thus, thought develops throughout this period in the direction of becoming operational, an achievement which appears at the beginning of the concrete operational stage. There are other unique characteristics of thought in the preoperational child. The inconstancy of perception and subsequent limits on the child's knowledge make thought prelogical. Thought also is characterized by a lack of reversibility making thought at this stage unidirectional, i.e., moving from a beginning to a conclusion without the ability to reverse the process. Due to the

characteristics cited above, Piaget refers to thought at this stage as preoperational. The uniqueness of thought at this stage is manifested in Piaget's choice of the term 'preoperational' to characterize the whole developmental stage.

Thought in the preoperational child is demonstrated first by symbolic play, an activity limited to the stage under consideration. Symbolic play is akin to 'thinking out loud' whether or not language is involved. Such play develops sequentially from practice play and simple deferred imitation through make-believe play until it culminates in the reality orientation of the concrete operational stage. Thus, the development is from the simple reality orientation of the sensori-motor period through fantasy and back to reality, where symbolic play ceases to exist. As a result of the sequence, Piaget takes the position that symbolic play not only expresses thought but is essential for the assimilation of reality to the growing ego. When reality is finally assimilated and stabilized at the end of the preoperational period, symbolic play ceases to exist since the child has no further need for it.

The nature of symbolic play is of particular interest to us as are the behaviors which the child uses to represent his thought. Simple make-believe play represents recall of events from the past permitting the child to adapt them to himself in order to come to know them. However, simple make-believe play gives way to highly complex forms of symbolic play. For example, several roles may be assumed simultaneously by a child and be reflected in changes in body and speech mannerisms as he changes from one role to another. It should be noted however, that this is not role playing as we usually think of it since the child is not simply playing the roles but, for a brief period of time, is living them.

Such behavior facilitates his understanding of others and his ultimate movement from egocentric to sociocentric thought.

Two other kinds of symbolic play are identified by Piaget, namely, compensatory play and liquidating play. Both involve all of the attributes of complex make-believe play but in addition are highly loaded with affect. Piaget (1962, p. 131) refers to compensatory play as a form of play used for "correcting reality rather than reproducing it for pleasure." Liquidating play for Piaget (1962, p. 132) "consists in neutralizing a fear through play, or in doing in play what one would not dare do in reality." Freudians will recognize both as catharsis and the working through of traumatic situations. They will also be interested in Piaget's unique position on dreams as an extension of thought processes. Piaget (1962) sees the nightmares so prevalent in this period as a manifestation of the child's thought processes. He takes the position that it is the extension into the sleeping state of the thought processes underlying symbolic play which produces the highly affective dreams of the preoperational child.

For us, symbolic play and dreams are both cogent since they represent not only the development of thought but also development of affect from the self-esteem of the sensori-motor period through the complex array of emotions experienced by the child and others in his environment. Even more important, they lead to an understanding of feelings which permits the child to develop empathy for others as he moves into the concrete operational period of development.

As the child's thought reapproaches reality as evidenced by his play, thought changes from the egocentric, transductive thought characteristic of the younger child in the direction of the intuitive thought of the

older preoperational child. Based upon increasing knowledge of his environment, the child is able to develop expectancies about events occuring in his environment. Thus, he becomes able to make educated guesses about solutions to problems involving causality. Yet, even when his hunches are correct, the child is unable to explain the bases for his intuitions, indicating both the static nature of preoperational thought and the lag in language development mentioned earlier. However, the shift from transductive to intuitive thought is indicative of the sequential, hierarchical development of knowledge and intelligence throughout the preoperational period.

To summarize the preoperational period and its chief characteristics, we can look to the development of each of the processes under consideration during that period. Throughout, learning in the broad sense is taking place as reflected in increasing knowledge and intelligence. Learning in the restricted sense takes place as indicated by the increase in oral language facility which is reflected both in increasing vocabulary and the use of increasingly complex sentence structures. Perception moves from inconstancy to constancy as reflected in increasingly accurate judgment and intuitive thought. Thought moves in the directions of sociocentric from egocentric, logical from prelogical, and reversible from irreversible. Further, thought progresses from reality orientation through highly imaginative thought and back to reality orientation at a much higher level than earlier. Thus, the magical thought of the young child is replaced by thought which reflects expanding knowledge, producing an understanding of affect as a by-product.

Two factors are obvious from the above paragraph. First, each of the variables which we have identified as contributing to reading compre-

hension is developing sequentially throughout the preoperational stage. Second, as we approximate the end of the preoperational stage, we can no longer speak of the variables under consideration as distinct entities since each is defined in terms of the others. It is the latter observation which is of the most concern to us for it reflects the intercoordination of each of the processes under consideration. It is this successful intercoordination which permits the child to embark upon Piaget's third stage of development, that of concrete operations. Furthermore, it is the same intercoordination which will permit the emergence of reading comprehension.

Concrete Operational Stage

As might be expected, the transition from the preoperational stage to that of concrete operations is gradual and uneven. However, when the child arrives at the advanced level, dramatic changes occur in cognitive functioning. At the time the processes become intercoordinated, thought becomes anticipatory and active instead of static. Prelogical, transductive thought gives way to one form of logical thought, namely, inductive thought. Egocentric thought is replaced by sociocentric thought which, for the first time, permits the child to understand that others hold points of view which may differ from his own. Simultaneously, thought becomes reversible. Thus, in Piaget's terms, thought moves from the preoperational level of development to an operational level.

The advent of sociocentric thought permits a marked change in the understanding of affect. Until the concrete operational period, the child is aware only of his own emotions. Although he develops an increased understanding of these throughout the preoperational period, he

remains unaware that affect in others may differ markedly from his own. Thus, with the elimination of egocentric thought, the child becomes able to understand emotion in others and to develop empathy for their feelings.

Simultaneously with the above changes, changes in perception occur. The child is no longer limited by inconstancy in perception nor is he bound to his own perceptions. As he achieves constancy, the child becomes able to take into consideration two or more dimensions of a situation, a feat which he could not accomplish earlier. The appearance of the conservation continuum attests to such changes. Moreover, due to his increased knowledge, the child can go a step farther, i.e., he can consider dimensions which he knows from experience to be present but which cannot be perceived in a given context. Thus, the child is freed to make more accurate judgments about his universe than he could previously.

Another startling change occurs at this time of transition. The rate of knowledge acquisition changes as the child moves from the pre-operational stage to the concrete operational stage. Since the child must actively develop all cognitive structures in the process of coming to know, he is faced with a monumental task in the two earlier periods of development. The task of organizing, assimilating, and accommodating his environment is complex due to the complexity of the environment itself as well as to the developmental limitations of the child. As a result, coming to know is a slow process throughout the first two stages of development. However, with the advent of concrete operations, the incomplete structures become complete and intercoordinated. In Piaget's terms, some vertical and horizontal decaulages are eliminated and pre-concepts emerge as concepts. Although the completion of most will not

remain stable during future cognitive development, the child is freed to gain further knowledge at a much more rapid rate than he could earlier.

A comparable change in rate occurs in the area of learning. This rate change is particularly dramatic in the language domain. The child generates complex new sentences which comply with the basic structure of his native language. He becomes able to use language in addition to action to express his personal thoughts and feelings. Thus, language is no longer restricted to the role of accompanying the child's activity but becomes social in nature. As a result, the concrete operational child is able to carry on conversations with peers as well as with adults. In brief, the child has succeeded in transferring the meanings which he has abstracted from his action upon objects to the arbitrary signs involved in the oral language of his culture.

Reading

It is at this point that the child becomes ready to embark upon reading, another culturally imposed, highly complex learning task. In learning to read, the child is faced with several problems. First, he must develop the concept that the written word or arbitrary symbol stands for the arbitrary sign or spoken word which he has come to learn. Next, he must master the arbitrary symbols in the task which we speak of as word recognition. The attainment of word recognition takes time. However, the child's newly gained operational knowledge permits him to gain the skill more rapidly than if the task were introduced in the previous stage of development. This change in rate may also be attributed to his sharpened perceptual discrimination as well as to his increased ability to generalize that which he has learned or come to know. It should

be noted, however, that word recognition at this time represents only the beginning of a continuum which ranges from the recognition of concrete object words through the highly esoteric words associated with many disciplines. Thus, the appearance of word recognition represents the origin of a sequence as well as the culmination of one, although both lie primarily within the language domain.

However, the ability to recognize written symbols does not assure reading with comprehension. Before comprehension evolves, the child is faced with yet another complex operation, that of transferring to the arbitrary symbol all that he has come to know about the object and previously has transferred to the arbitrary sign. If he lacks the object experience, the task is more complex and less meaningful than if he has extracted the knowledge for himself. If he lacks both the object experience and the sign experience, he is faced with a problem which is virtually insoluble. This is the case since, under the best of circumstances, reading comprehension is a highly abstract task which involves the development of meaning followed by a dual shift of that meaning first from the object to the spoken word and subsequently from the spoken word to the written word. In brief, reading comprehension represents the reciprocal relationship between knowing and learning. The absence of knowing prohibits the reciprocal exchange, relegating language completely to the area of learning and, consequently, to a less stable and more tenuous position than under optimal conditions. Reading based upon learning alone is subject to the laws of learning and forgetting much more than reading based upon both knowledge and learning. Thus, the end result of the former ranges from less than maximal reading comprehension to no comprehension whatsoever.

Since cognition and affect are inseparable, when meaning is shifted from the object to the sign and from the sign to the symbol, the affect associated with that meaning also is shifted. It is only after the transfer of meaning and affect has been accomplished that the child is able to read with understanding. When the child succeeds in the task of relating knowledge and affect to language learning, the two processes become intercoordinated and functional for the child. That is, as he perceives the arbitrary symbol, the symbol in able to elicit the meaning and affect which the child has developed actively for himself. In turn, he becomes ready to move to the next stage of the language continuum, that of expressing his personal knowledge, feelings, and thoughts in terms of symbols or written words.

As with word recognition, when reading comprehension emerges as a measurable skill, it represents the culmination of one set of developmental processes and the beginning of a continuum of increasing skill in the abstraction of meaning from written language. The continuum moves from the ability to decipher simple, concrete messages through the ability to decipher complex, abstract, and symbolic messages. Simply stated, the child's ability to derive meaning from simple concrete stories advances to the ability to derive meaning from highly specialized literary forms ranging from theoretical prose to symbolic poetry.

While we cannot attend here to the advanced stages involved in the development of comprehension, four points can be made which should provide insight into the advanced stages of reading comprehension as well as aid us in summarizing our discussion. Simply stated they are as follows:

1. If learning is to be functional, it must be based upon understanding or knowledge.

2. Neither learning nor knowledge alone can facilitate reading comprehension. Both are essential to the emergence of the skill as well as to continued advancement along the continuum of meaning.

3. Learning and knowledge complement one another within the language domain, resulting in reading comprehension at increasingly higher levels of skill. That is, word recognition and reading comprehension become reciprocal in that the meaning of an unknown word can be derived from its context while those words which are known will influence how a message is decoded. The end result of this relationship in most competent readers is that the reading vocabulary ultimately surpasses the speaking vocabulary.

4. Finally, the development of meaning and the learning of language are both complex, sequential processes. As educators we should be aware that to violate the sequence is to violate the child.

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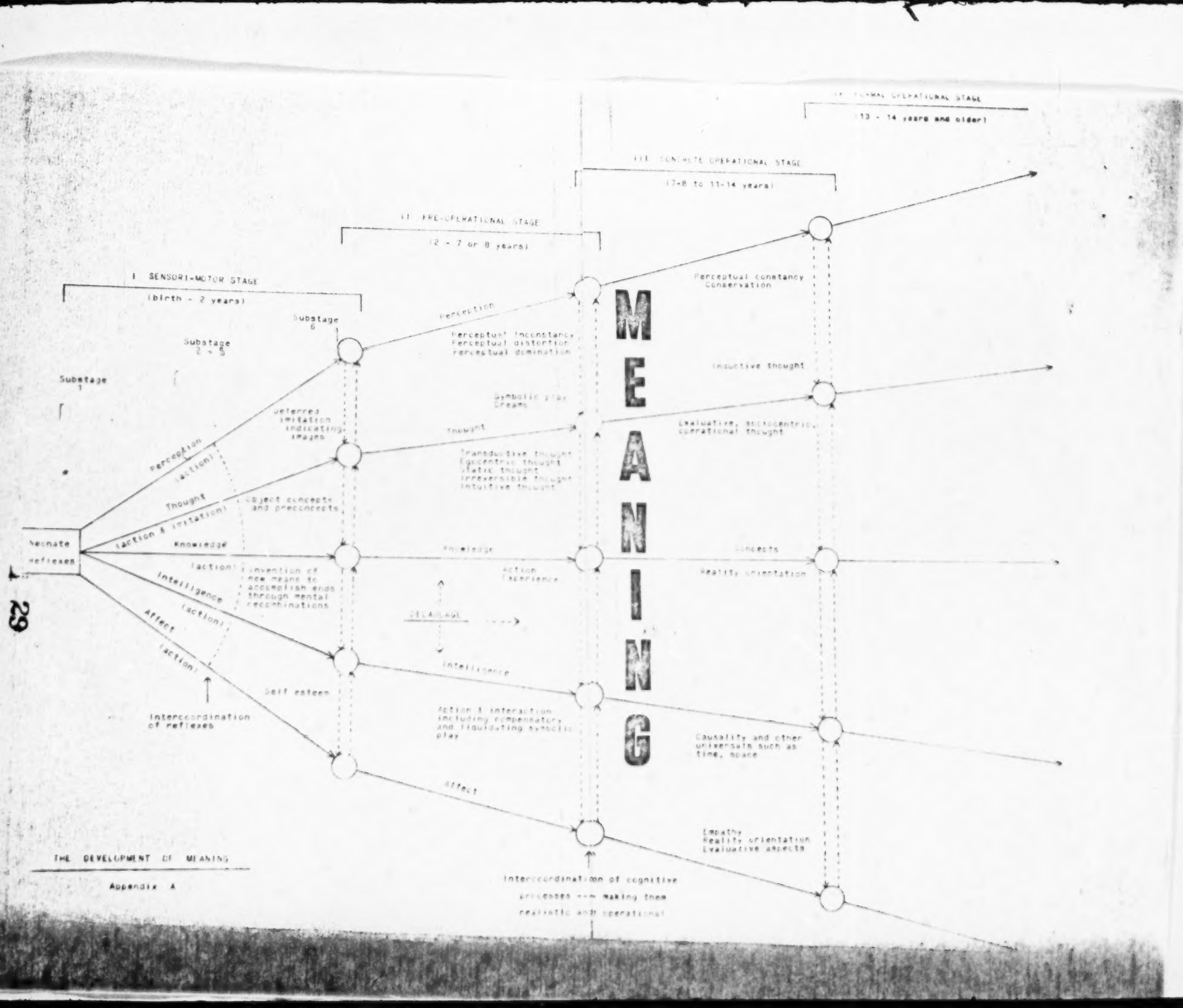
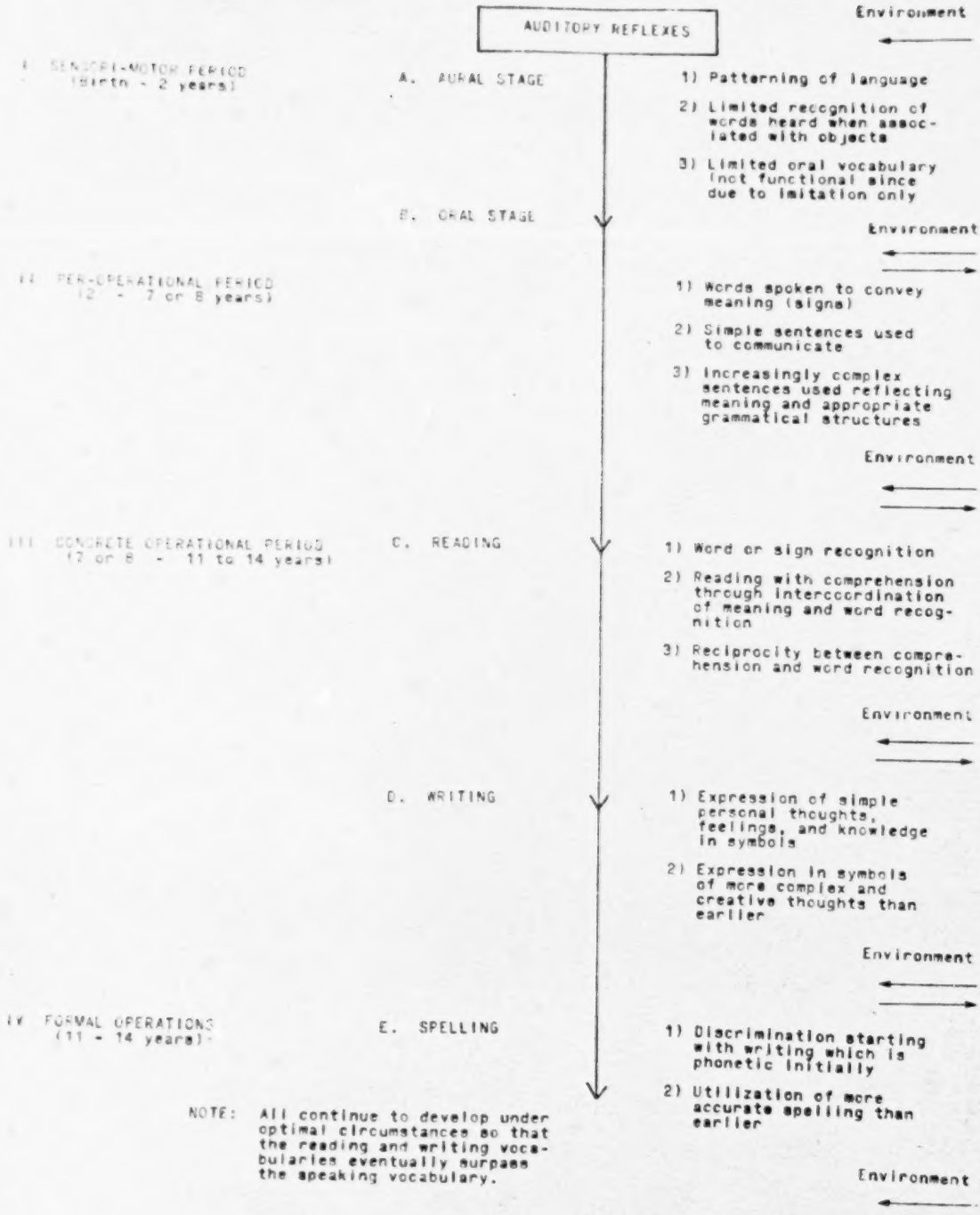


THE DEVELOPMENT OF MEANING

Appendix A

THE LEARNING OF LANGUAGE

Appendix B


AUDITORY REFLEXES
Environment
I SENSORI-MOTOR PERIOD (birth - 2 years)
A. AURAL STAGE
1) Patterning of language
2) Limited recognition of words heard when associated with objects
3) Limited oral vocabulary (not functional since due to imitation only
B. ORAL STAGE
Environment
II PER-OPERATIONAL PERIOD (2 - 7 or 8 years)
1) Words spoken to convey meaning (signs)
2) Simple sentences used to communicate
3) Increasingly complex sentences used reflecting meaning and appropriate grammatical structures
Environment
III CONCRETE OPERATIONAL PERIOD (7 or 8 - 11 to 14 years)
C. READING
1) Word or sign recognition
2) Reading with comprehension through intercoordination of meaning and word recognition
3) Reciprocity between comprehension and word recognition
Environment
D. WRITING
1) Expression of simple personal thoughts, feelings, and knowledge in symbols
2) Expression in symbols of more complex and creative thoughts than earlier
Environment
IV FORMAL OPERATIONS (11 - 14 years)
E. SPELLING
1) Discrimination starting with writing which is phonetic initially
2) Utilization of more accurate spelling than earlier
Environment

NOTE: All continue to develop under optimal circumstances so that the reading and writing vocabularies eventually surpass the speaking vocabulary.